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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/529,192	06/26/00	JUNG T	SPM-290-A

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EXAMINER	
MARKHAM, W	
ART UNIT	PAPER NUMBER
1762	7

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

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1- File Copy

Office Action Summary	Application No.	Applicant(s)	
	09/529,192	JUNG ET AL.	
	Examiner	Art Unit	
	Wesley D Markham	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other: .

DETAILED ACTION

Acknowledgement is made of applicant's preliminary amendment A, filed as paper #5 on April 6, 2000, in which Claims 3 - 14, 16 - 18, and 21 - 22 were amended. Claims 1 – 22 are pending in application serial # 09/529,192, and an Office Action on the merits follows.

Specification

1. Regarding the abstract of the disclosure, the introductory phrase, "The invention concerns..." is improper (line 1). The applicant is reminded of the proper language and format for an abstract of the disclosure. The language should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc. The applicant is suggested to delete the phrase, "The invention concerns."

2. Regarding the disclosure, the applicant is suggested to make the following changes.

   a. The specification does not contain section headings such as "BACKGROUND OF THE INVENTION", "BRIEF SUMMARY OF THE INVENTION", "BRIEF DESCRIPTION OF THE DRAWINGS", and "DETAILED DESCRITPION OF THE INVENTION." The heading, "BRIEF DESCRIPTION OF THE DRAWINGS" is required, and the other headings are suggested in order to clarify the specification.

b. The paragraph, "This task is solved with respect to process technology by Claim 1, and, concerning a device to perform the process, by Claim 16. The subclaims in each case give advantageous embodiments and further refinements of the invention" on page 2 of the specification is improper. It is improper to refer to the claims of the application in the body of the disclosure. The applicant is suggested to delete this paragraph from the specification. Appropriate correction is required.

Claim Objections

3. Claim 16 is objected to because of the following informality. Per the applicant's preliminary amendment A, Claim 16 was amended to read, "Device according to one of Claims 14 Claim1, characterized by the fact that gas supply (3) is arranged in the discharge region (2) or immediately outside it." This language is confusing. For examination purposes and, since Claim 14 is a device claim and Claim 1 is a process claim, Claim 16 was interpreted by the examiner to read, "Device according to Claim 14, characterized by the fact that gas supply (3) is arranged in the discharge region (2) or immediately outside it." Appropriate correction is required.

4. Claims 1 – 22 are objected to because of the following informality. The claims are not written in a manner that is commensurate with conventional US practice. Appropriate correction is required. In addition, the applicant is suggested to rewrite Claim 14 in independent form in order to more clearly define the scope of the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1 – 9 and 11 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kashiwaya et al. (USPN 5,595,792).

7. Regarding Claim 1, Kashiwaya et al. teach a process for the surface treatment of at least one electrically conducting substrate or a substrate that has been coated so as to be conducting (Col.7, lines 66 – 67, and Col.8, lines 1 – 4), by means of a gas placed in the region of an electric discharge (Figure 1 and Col.3, lines 10 – 25), wherein the discharge zone is restricted on at least two opposite sides by surfaces to be treated (Figure 1 and Col.3, lines 32 – 41). Specifically, Kashiwaya et al. teach the continuous surface treatment of a web-like substrate with plasma in the production of a magnetic recording medium. Kashiwaya et al. does not explicitly teach that the web-like substrate forms a hollow cathode. However, the substrate "is made to run along one face of the sheet-shaped plasma stream and then returns to run along the other face of the plasma stream to thereby obtain a state in which the substrate is arranged opposite to the plasma stream, and at the same time, an envelope space obtained by enclosing the plasma stream with the substrate is formed..." (Col.3, lines 34 – 40) (i.e., the plasma is confined in a hollow area defined by the substrate). In addition, the substrate passes

over an electrode roller made of metal material to charge the surface of the substrate with electricity with a DC voltage of 0 to 1000 V with either a positive or negative polarity (Col.6, lines 47 – 56). Therefore, it would have been obvious to one of ordinary skill in the art that, depending on the desired charge and polarity imparted to the substrate, the substrate would act as a "hollow cathode" to promote film forming as desired by Kashiwaya et al.

8. Kashiwaya et al. teach all the limitations of Claims 2 – 9 and 11 – 13 as set forth in paragraph 7 and below, including:

a. Claim 2 – The substrate surface is treated by hollow cathode discharge (paragraph 7 above, and Col.3, lines 10 – 25).

b. Claim 3 – One or more continuously supplied substrates can be fed to restrict the discharge region, at least in some regions (Figure 1 and Col.3, lines 32 – 61).

c. Claim 4 – Band shaped substrates are treated (Figure 1 and Col.4, lines 59 – 63).

d. Claim 5 – At least one of the substrates is turned at least once to change the direction of movement of the substrate(s), and the discharge region is restricted on at least one side by the substrate before the turn in the direction of movement of the substrate and on at least one other side by substrate regions after the turn in the direction of movement (Figure 1, Col.3, lines 32 – 41, and Col.6, lines 57 – 62).

e. Claim 6 – The discharge region is restricted on two sides by substrate surfaces at a distance of 1 mm to 50 cm apart. Specifically, Kashiwaya et al. teach that the distance from the center of the plasma stream to the film forming surface was selected to be in a range of 50 to 75 mm (Col.10, lines 51 – 53). In other words, the substrate surfaces were at a distance of 100 to 150 mm (10 to 15 cm) apart.

f. Claim 7 – The electric discharge occurs at a pressure between 0.01 mbar and 100 mbar. Specifically, Kashiwaya et al. teach that the discharge pressure is in a range of 0.001 to 0.01 Torr (approximately 0.0013 mbar to 0.013 mbar) (Col.9, lines 51 – 53).

g. Claim 8 – At least one substrate is grounded. Specifically, Kashiwaya et al. teach that a DC voltage of 0 to 1000 V can be applied to the substrate surface (Col.6, line 55). When a DC voltage of 0 V is chosen, then the substrate is at ground potential (i.e., grounded).

h. Claim 9 – The voltage applied between at least one substrate and a plasma formed by electric discharge is 1 – 3000 V. Specifically, Kashiwaya et al. teach a discharge voltage of 60 to 120 V and a substrate bias voltage of 0 to 1000 V with either a positive or negative polarity (Col.9, lines 65 – 67, and Col.10, lines 42 – 45).

i. Claim 11 – The discharge is activated or supported by a DC voltage, a pulsed DC voltage, or a low-, intermediate-, or high-frequency AC voltage. Specifically, Kashiwaya et al. teach a DC bias voltage applied to the substrate

and a radio frequency AC voltage to sustain the plasma (Col.9, lines 65 – 67, and Col.10, lines 23 – 25).

j. Claim 12 – Gas is fed into the discharge region or immediately outside it (Figure 2, reference number 25, and Col.5, lines 1 – 2).

k. Claim 13 – Gas is removed from the discharge region or immediately outside it (Figure 2, reference number 32, and Col.5, lines 23 – 37).

9. Regarding Claim 14, Kashiwaya et al. teach a device for implementing the process according to Claim 1 (paragraph 7 above and Figure 1) with at least one substrate that defines a discharge region (Figure 1, reference number 58) enclosed on at least two sides by substrate surfaces (Figure 1, reference number 21), a device for supplying electrical energy to the discharge region (Figure 1, reference number 63), a vacuum chamber to enclose the discharge region (Figure 1, reference numbers 30, 31a, and 31b), a means for supplying gas to the vacuum chamber (Figure 2, reference number 25), a means for removing gas from the vacuum chamber (Figure 1, reference numbers 32 – 33), and an anode placed in the region of the substrate (Figure 2, reference number 36). Kashiwaya et al. does not explicitly teach that the substrate forms a hollow cathode. However, for reasons set forth in paragraph 7 above, it would have been obvious to one of ordinary skill in the art that the substrate would form a hollow cathode.

10. Kashiwaya et al. teach all the limitations of Claims 15 – 22 as set forth in paragraph 9 and below, including:

a. Claim 15 – Substrate cooling is provided (Col.8, lines 19 – 20).

b. Claim 16 – The gas supply is arranged in the discharge region or immediately outside of it (Figure 2 and Col.7, lines 1 – 3).

c. Claim 17 – The gas removal is arranged in the discharge region or immediately outside of it (Figure 2, reference number 32, and Col.5, lines 39 – 46).

d. Claim 18 – At least one substrate is a continuously running band that can be unwound from a first spool and wound onto a second spool (Figure 1, reference numbers 43 and 44, and Col.5, lines 1 – 22).

e. Claim 19 – The spools are arranged outside the vacuum chamber and the band can be introduced into and removed from the vacuum chamber by vacuum locks. Specifically, by interpreting the "vacuum chamber" of Kashiwaya et al. to include only film forming chamber (30), The spools are arranged outside vacuum chamber (30) in delivery chamber (31a) and take-up chamber (31b). In addition, the substrate passes from the delivery chamber through a "seal plate" (i.e., a vacuum lock) into the film forming chamber and then through another "seal plate" and into the take-up chamber (Col.5, lines 8 – 28).

f. Claim 20 – The spools are arranged inside the vacuum chamber. Specifically, by interpreting the "vacuum chamber" of Kashiwaya et al. to include the entire vacuum chamber (22), the spools are arranged inside the vacuum chamber (Figure 1 and Col.4, lines 64 – 65).

g. Claim 21 – Deflection elements that are electrically isolated from the device components and the substrate(s) are arranged in the region of the sides of the discharge region not restricted by the substrate surfaces (Figure 1, reference number 60, and Col.7, lines 10 – 17).

h. Claim 22 – Deflection elements that are electrically isolated from the device components and the substrate(s) are arranged in regions of device components in which parasitic discharges could be formed due to their potentials (Figure 1, reference number 60, and Col.7, lines 10 – 17).

11. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kashiwaya et al. (I) (USPN 5,595,792) in view of Kashiwaya et al. (II) (USPN 5,935,335) or Hudgens et al. (USPN 4,737,379).

12. Kashiwaya et al. (I) teach all the limitations of Claim 10 as set forth in paragraph 7 except a process wherein the discharge is activated or supported by microwaves. Kashiwaya et al. (I) teach that the process is supported by a radio frequency (RF) electric source (Col.7, lines 60 – 65, and Figure 1, reference numbers 63 and 64). Kashiwaya et al. (II) teach that, in the formation of a thin film on a web-like substrate by plasma discharge in the continuous production of magnetic recording medium (Abstract and Figure 1), plasma supported by microwaves has a higher density than plasma supported by high-frequency waves (e.g., radio frequency waves) and therefore leads to a higher speed of film formation (Col.1, lines 54 – 60, and Col.2, lines 45 – 51). Hudgens et al. teach, in the deposition of a hard protective film on a substrate by

plasma CVD, the use of microwave energy in plasma CVD provides higher deposition rates and nearly total utilization of feed stock reaction gases in comparison to energy in the RF domain (Col.15, lines 1 – 10). Therefore, it would have been obvious to one of ordinary skill in the art to use microwave energy instead of RF energy to activate or support the plasma process of Kashiwaya et al. (I) as taught by Kashiwaya et al. (II) or Hudgens et al. with the reasonable expectation of obtaining a high film deposition rate as taught by Kashiwaya et al. (II) or Hudgens et al. and desired by Kashiwaya et al. (I).

13. Claims 1 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Echizen et al. (USPN 5,527,391).

14. Regarding Claim 1, Echizen et al. teach a process for the surface treatment of at least one electrically conducting substrate or a substrate that has been coated so as to be conducting (Abstract and Col.28, lines 58 – 61), by means of a gas placed in the region of an electric discharge (Col.35, lines 53 – 55, and Col.10, lines 25 – 44), wherein the discharge zone is restricted on at least two opposite sides by surfaces to be treated (Figure 1 and Abstract). Specifically, Echizen et al. teach the continuous surface treatment of an electrically conductive band-shaped substrate with plasma. Echizen et al. does not explicitly teach that the band-shaped substrate forms a hollow cathode. However, the moving substrate confines the plasma discharge region to a hollow area (Figure 1). In addition, the band-shaped member (i.e., the substrate) may be directly used as an electrode for current passage (Col.28, lines 58 – 61). Therefore, it would have been obvious to one of ordinary skill in the art that since the substrate may act as

an electrode and, depending on the desired charge and polarity imparted to the substrate, the substrate would act as a "hollow cathode" in the process of Echizen et al.

15. Echizen et al. teach all the limitations of Claims 2 – 13 as set forth in paragraph 14 and below, including:

a. Claim 2 – The substrate surface is treated by hollow cathode discharge (paragraph 14 above, and Col.28, lines 58 – 61).

b. Claim 3 – One or more continuously supplied substrates can be fed to restrict the discharge region, at least in some regions (Figure 1 and Abstract).

c. Claim 4 – Band shaped substrates are treated (Abstract).

d. Claim 5 – At least one of the substrates is turned at least once to change the direction of movement of the substrate(s), and the discharge region is restricted on at least one side by the substrate before the turn in the direction of movement of the substrate and on at least one other side by substrate regions after the turn in the direction of movement (Figure 1).

e. Claim 6 – The discharge region is restricted on two sides by substrate surfaces at a distance of 1 mm to 50 cm apart. Specifically, Echizen et al. teach that the inner diameter of the film forming space was from 120 mm to 180 mm (i.e., 12 – 18 cm) (Col.14, lines 1 – 5).

f. Claim 7 – The electric discharge occurs at a pressure between 0.01 mbar and 100 mbar. Specifically, Echizen et al. teach that the inner pressure of the film-forming space is in a range of 0.008 to 0.3 Torr (approximately 0.008 mbar to 0.3 mbar) (Table 4).

g. Claim 8 – At least one substrate is grounded. Specifically, Echizen et al. teach that, in some applications, the band-shaped substrate is grounded (Col.43, lines 61 – 67).

h. Claim 9 – The voltage applied between at least one substrate and a plasma formed by electric discharge is 1 – 3000 V. Specifically, Echizen et al. teach a discharge voltage of between 65 V and 190 V (Table 6).

i. Claim 10 – The discharge is activated or supported by microwaves (Abstract).

j. Claim 11 – The discharge is activated or supported by a DC voltage, a pulsed DC voltage, or a low-, intermediate-, or high-frequency AC voltage. Specifically, Echizen et al. teach the use of a DC, ripple, and/or AC bias voltage (Col.11, lines 20 – 21).

k. Claim 12 – Gas is fed into the discharge region or immediately outside it (Figure 1, reference number 106, and Col.35, lines 52 – 54).

l. Claim 13 – Gas is removed from the discharge region or immediately outside it (Figure 1, reference number 107, and Col.35, line 5).

16. Regarding Claim 14, Echizen et al. teach a device for implementing the process according to Claim 1 (paragraph 14 above and Figures 1 – 4) with at least one substrate that defines a discharge region (Figure 1, reference number 101) enclosed on at least two sides by substrate surfaces (Figure 1, reference number 104), a device for supplying electrical energy to the discharge region (Figure 1, reference numbers 102 –

103), a vacuum chamber to enclose the discharge region (Figure 3, reference numbers 302 – 307), a means for supplying gas to the vacuum chamber (Figure 1, reference number 106), a means for removing gas from the vacuum chamber (Figure 1, reference number 107, and Figure 3, reference numbers 319, 321, and 323), and an anode placed in the region of the substrate (Col.26, lines 28 – 31). Echizen et al. does not explicitly teach that the substrate forms a hollow cathode. However, for reasons set forth in paragraph 14 above, it would have been obvious to one of ordinary skill in the art that the substrate would form a hollow cathode.

17. Echizen et al. teach all the limitations of Claims 15 – 20 as set forth in paragraph 16 and below, including:

a. Claim 15 – Substrate cooling is provided (Col.11, lines 66 – 67).

b. Claim 16 – The gas supply is arranged in the discharge region or immediately outside of it (Figure 1, reference number 106).

c. Claim 17 – The gas removal is arranged in the discharge region or immediately outside of it (Figure 1, reference number 107).

d. Claim 18 – At least one substrate is a continuously running band that can be unwound from a first spool and wound onto a second spool (Abstract and Figures 3 – 4).

e. Claim 19 – The spools are arranged outside the vacuum chamber and the band can be introduced into and removed from the vacuum chamber by vacuum locks. Specifically, by interpreting the "vacuum chamber" of Echizen et al. to include only the film forming spaces, The spools are arranged outside the film

forming spaces in carrying-in chamber (302) and carrying-out chamber (307). In addition, the substrate passes along the line from the carrying-in chamber through the film forming spaces and into the carrying-out chamber through the use of load lock mechanisms (i.e., "vacuum locks") (Col.40, lines 18 – 23 and Figure 7).

f. Claim 20 – The spools are arranged inside the vacuum chamber. Specifically, by interpreting the "vacuum chamber" of Echizen et al. to include the entire vacuum chamber system shown in Figures 3 and 4, the spools are arranged inside the vacuum chamber (Figures 3 and 4).

18. Claims 21 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Echizen et al. (USPN 5,527,391) in view of Kashiwaya et al. (I) (USPN 5,595,792).

19. Echizen et al. teach all the limitations of Claims 21 – 22 as set forth in paragraph 16 except the use of electrically isolated deflection elements arranged in the regions not restricted by the substrate surfaces and in which parasitic discharges could be formed. Kashiwaya et al. (I) teaches the use of deflection elements in the continuous treatment of a band-shaped substrate by plasma CVD to prevent the undesired deposition of the film onto regions not protected by the substrate surfaces such as the guide rolls (Col.7, lines 4 – 17). Since Echizen et al. also uses guide rolls in the continuous coating of a band-shaped substrate by plasma CVD (see Figure 3, reference number 112), it would have been obvious to one of ordinary skill in the art to incorporate the deflection elements taught by Kashiwaya et al. (I) in the apparatus of Echizen et al. with the

reasonable expectation of successfully protecting the guide rolls of Echizen from unwanted film deposition and accumulation as taught by Kashiwaya et al. (I).

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fukada et al. (JP 05144748 A) teaches a plasma CVD method utilizing electrode shields in order to prevent a parasitic discharge by electrodes, relevant to Claims 21 and 22. Izu et al. (USPN 5,411,591) teaches a microwave plasma CVD method comprising creating a discharge zone in between the surfaces of a moving substrate.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (703) 308-7557. The examiner can normally be reached on Monday - Friday, 7:30 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-5408 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Wesley D Markham
Examiner
Art Unit 1762

WDM
May 10, 2001

WDM

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